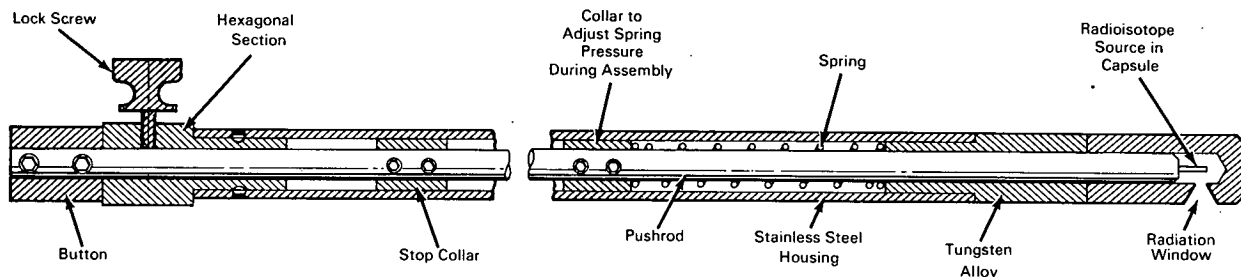


NASA TECH BRIEF



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Low-Energy Gamma Ray Inspection of Brazed Aluminum Joints



The problem:

To provide a suitable radioisotope (gamma ray source) and exposure probe for radiographic inspection of brazed aluminum joints in areas of limited accessibility. The gamma ray intensity of the radioisotope was required to be sufficiently low to prevent film burnout at the imposed short source-to-film distances (only a few inches) through the low-density aluminum.

The solution:

Americium 241, a transuranium nuclide with a half-life of approximately 465 years, was selected as the radioisotope. It is a gamma ray source with principal photon energy of approximately 0.060 Mev. The powdered isotope is contained in a capsule made of stainless steel with walls approximately 0.008 inch thick. The ends of the capsule are plugged with tungsten and then gold brazed.

The sealed capsule is mounted at the end of a spring-loaded pushrod in the probe assembly, which is in the form of a cylinder, 6 inches long by 0.375 inch outside diameter. A hexagonal section (0.5 inch long) at one end (the hand end) prevents the probe from rolling when it is set down; it also provides space for lock screws. In the "off" position the capsule

is automatically retracted by spring compression within the tungsten alloy tube, which serves as a radiation shield. The capsule is exposed for radiography by pressing on the button fastened to the pushrod, and locking it in place with the lock screw. Positive stops for the "off" and "on" positions of the probe are provided by the stop collar and pushbutton.

Notes:

1. The tungsten alloy shield and stainless steel housing are magnetic. Use of magnetic materials facilitates optional positioning of the probes with magnetic clamps during exposures of the radioisotope.
2. The parts are permanently assembled with set screws and have films of boron carbide-filled epoxy resin between mating surfaces to prevent dislocation during use or other handling.
3. The probe must be handled only by a qualified radiographer in accordance with prescribed safety regulations for radioactive materials.
4. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B67-10337

(continued overleaf)

Patent status:

No patent action is contemplated by NASA.

Source: John A. Brown
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